(12) UK Patent Application (19) GB (11) 2 276 875 (13) A

(43) Date of A Publication 12.10.1994

(21) Application No 9304949.2

(22) Date of Filing 11.03.1993

(71) Applicant(s)
MHJ Ltd

(Incorporated in the United Kingdom)

Blacksmith Lane, Chilworth, NR GUILDFORD, Surrey, GU4 8NL, United Kingdom

(72) Inventor(s)
Richard Melhuish

(74) Agent and/or Address for Service
D Young & Co
21 New Fetter Lane, LONDON, EC4A 1DA, United Kingdom

(51) INT CL[5]
C02F 1/52

(52) UK CL (Edition M)
C1C CACC C210 C253 C31X C332 C40Y C400

(56) Documents Cited
GB 1241962 A
WPI Accession Number 90-278471/37 JP2194891A
WPI Accession Number 82-86515E/41 JP57141483A
WPI Accession Number 78-09187A/05 JP52151212A
WPI Accession Number 78-05101A/03 JP5214808A
WPI Accession Number 74-75887V/44 BE 816403A

(58) Field of Search
UK CL (Edition M) C1C CACC CRCC
INT CL[5] C02F
ONLINE DATABASE-WPI

(54) Methods and a composition for dewatering silt

(57) A method of substantially dewatering silt using a composition comprising quick lime; and optionally pulverised fuel ash.

GB 2 276 875 A

Methods and A Composition for Dewatering Silt

The present invention relates to a composition particularly, but not exclusively, for dewatering dredged silt, and to methods of dewatering dredged silt.

Silt which is cleared from, for example, waterways, estuaries, harbours and lakes by dredging must subsequently be disposed of. Previously it was common to dump the dredged silt adjacent to the banks of the waterway, estuary, harbour or lake from which the silt had been cleared. However, with the introduction of the Waste Regulation Act in 1992, dredged silt has or can be classified as waste and therefore may need to be disposed of in licensed landfill sites. As a result of this legislation, we have realised that it would be advantageous to have a fast, flexible and economic way of dewatering silt for at least the following reasons:

the wet silt is expensive and dangerous to transport;

there has been a decrease in the availability of landfill sites which are prepared to accept wet material; and

with the renewed public awareness in environmental issues, and the fact that silt may now be regarded as waste, chemical analysis of the silt is becoming necessary, and is starting to dictate which landfill sites will accept the silt, and, if any, what uses the silt can be put to.

According to one aspect of the present invention there is provided a method of dewatering silt comprising the application of quick lime (calcium oxide) to the silt.

According to another aspect of the present invention there is provided a composition for use in dewatering silt comprising (a) quick lime; and (b) pulverised fuel ash, hereinafter referred to as PFA.

According to a further aspect of the present invention there is provided a method of dewatering silt comprising the application of a composition comprising (a) quick lime; and (b) PFA, to the silt.

In accordance with the present invention the term silt includes mineral silts and washings, as well as organic muds.

Whilst not wishing to be bound by any theory, it is believed that when using the two-component composition according to the present invention, comprising quick lime and PFA, to dewater silt, the two

components react together and in doing so provide a dewatered product which is stronger and drier than non-dewatered silt. The two-component composition also provides the advantage of "cementing" any heavy metals present into the dewatered silt. It is believed that such a "cementing" effect occurs due a high pH environment and the reaction between the quick lime and the PFA. It is also believed that the two-component composition has the effect of reducing the amount of toxins and contaminates, including PAHs, in the dewatered silt. The use of the two-component composition therefore provides a method of improving the strength and environmental integrity of silt as well as a method of dewatering the silt.

Both the quick lime and PFA have the advantage of being readily available products. The PFA is ash collected from the cooling towers of power stations, and is believed to be a coal/coke derivative.

The two-component composition when used in the method of the present invention has also been found to give rise to the following advantageous features:

(i) there is an increase in the shear strength of the dewatered silt, typically a tenfold increase in shear strength within 5 days, when compared with a control of non-dewatered silt. If the non-dewatered silt has a shear strength of 0 KN/m^2, the dewatered silt has been found to have a shear strength of about 3 KN/m^2 after 28 days;

(ii) there is a decrease in the relative moisture content of the dewatered silt when compared with a control of non-dewatered silt; we have found that using the two-component composition a ratio of solid to water of about 2.5:1 to 1.2:1 can be achieved after 28 days;

(iii) there is an increase in the stiffness of the dewatered silt, as evidenced by an increase in the stackability of the product, when compared with a control of non-dewatered silt;

(iv) the increase in volume of the dewatered product has been found to be less than directly proportional to the volume of composition added to the dewatered silt, i.e. if the amount of non-dewatered silt is 100% by volume and to it is added 25% by volume of the two-component composition, then the increase in volume of the dewatered product over the non-dewatered has been found to be less than 25% by volume; and

(v) there is an increased resistance to the cone penetration test

in the dewatered silt compared to the result for a non-dewatered control indicating a change from a liquid state in the control to a plastic state in the dewatered silt. The cone penetration test is a standard test for measuring plastic strength

Preferably, the quick lime used in the present invention is granular quick lime, fine ground quick lime or lime kiln dust. Lime kiln dust, although less reactive than the other forms of quick lime, can be used in the methods of the present invention; however a greater amount of the lime kiln dust than the other forms of quick lime may be required.

In some preferred embodiments, conventional dewatering additives may be included in the compositions of the present invention.

Preferably, when using the two-component composition about 2 to 5% by weight of quick lime and about 10 to 30% by weight of PFA is added for each 100% by weight of non-dewatered silt. In one preferred composition about 2.5% by weight of quick lime and about 20% by weight of PFA is added to 100% by weight of non-dewatered silt. In another preferred composition, about 5% by weight of quick lime and about 20% by weight of PFA is added to 100% by weight of non-dewatered silt. It will, however, be readily understood by one skilled in the art that the ratios of quick lime to PFA to silt can be readily varied according to the desired result. For example, the relative amounts of the composition and silt can be varied depending upon the condition of the silt, and the time available to dry the silt.

Preferably, when carrying out the method of the present invention the composition according to the present invention is mixed with the silt in a mixing plant. Preferably, a computerised mixing plant is employed as this allows the amounts of composition and silt used to be carefully controlled. After mixing is complete, the silt and composition mixture is preferably left in temporary lagoons for a period of time. As indicated above, the dewatered silt may improve over time. The period of time for which the silt is left, however, may depend on outside factors such as the site restrictions, the contract conditions, haulage costs and the landfill acceptability of the product.

CLAIMS

1. A method of substantially dewatering silt comprising the application of quick lime to silt.

2. A method according to claim 1 wherein the quick lime is granular quick lime, lime kiln dust or fine ground quick lime.

3. A composition for use in dewatering silt comprising
(a) quick lime; and
(b) pulverised fuel ash.

4. A composition according to claim 3 wherein the quick lime is granular quick lime, lime kiln dust or fine ground quick lime.

5. A method of substantially dewatering silt comprising the application of a composition according to either of claims 3 and 4 to silt.

6. A method according to claim 5 in which about 2 to 5% by weight and about 10 to 30% by weight of pulverised fuel ash is added for each 100% by weight of non-dewatered silt.

7. A method according to claim 6 in which about 2.5% by weight of quick lime and about 20% by weight of pulverised fuel ash is added for each 100% by weight of non-dewatered silt.

8 A method according to claim 6 in which about 5% by weight of quick lime and about 20% by weight of pulverised fuel ash is added for each 100% by weight of non-dewatered silt.

9. Dewatered silt produced according to the method of any one of claims 1, 2 and 5 to 8.

10. A composition according to claim 1 substantially as hereinbefore described.

11. A composition according to claim 3 substantially as hereinbefore described.

12. A method according to claim 5 substantially as hereinbefore described.

13. Dewatered silt according to claim 9 substantially as hereinbefore described.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9304949.2
Relevant Technical Fields (i) UK Cl (Ed.M) C1C (CAAC, CRCC) (ii) Int Cl (Ed.5) C02F	Search Examiner R HONEYWOOD Date of completion of Search 10 MAY 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASE - WPI	Documents considered relevant following a search in respect of Claims :- 1, 2 and 9 and 13 in part

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 1241962 (CLARK)	1 at least
X	WPI Accession Number 90-278471/37 and JP 2194891 A (KYOKITSU YUKI KOGYO (see abstract)	1 at least
X	WPI Accession Number 82-86515E/41 and JP 57141483 A (OSHIO SANGYOKK) see abstract	1 t least
X	WPI Accession Number 78-09187 A/02 and JP 52151212 A (KOBE STEEL KK) see abstract	1 at least
X	WPI Accession Number 78-05101 A/03 and JP 5214808 A (UBE INDUSTTRIES KK) see abstract	1 at least
X	WPI Accession Number 74-75887 V/49 and BE 816403 A (CENTRE PE RECH ROUTIERES) see abstract	1 at least

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).